IN THE CLAIMS:

1-10. (Cancelled)

11. (Previously Presented) A method of dynamically controlling and managing operating characteristics of a fuel cell system, including the steps of:

(A) providing a DC-DC converter circuit having an input connection to receive the output of a fuel cell, and connected to place a load across the fuel cell, said DC-DC converter circuit having internal switches that are operated at a duty cycle that is adjustable;

(B) providing a programmable controller that receives as an input, present and stored values of one or more operating characteristics, said programmable controller also being programmed to signal said DC-DC converter switches to adjust its duty cycle;

(C) identifying a weakest cell in a fuel cell stack;

(D) measuring the output voltage of the weakest cell;

(E) dynamically determining a desired value for said output voltage;

(F) comparing a present value of said weakest cell output voltage with a desired value;

(G) calculating a new duty cycle for the associated DC-DC converter within the fuel cell system required to substantially achieve said desired value for the output voltage of the weakest cell; and

(H) signaling said DC-DC converter to adjust its duty cycle to said new duty cycle.

12-14. (Cancelled)

15. (Currently Amended) A method of dynamically controlling and managing operating characteristics of a fuel cell system used to power a battery or an application device, including the steps of:

(A) providing a DC-DC converter circuit having an input connection to receive the output of a fuel cell, and connected to place a load across the fuel cell, said DC-DC converter circuit having internal switches that are operated at a duty cycle that is adjustable;

(B) providing a programmable controller that receives as an input, present and stored values of one or more operating characteristics, said programmable controller also being programmed to signal said DC-DC converter switches to adjust its duty cycle;

(C) dynamically determining a desired value for a plurality of operating characteristics of the fuel cell system, depending upon the operating conditions of the fuel cell system;

(D) measuring said plurality of operating characteristics;

(E) dynamically determining an output power of the fuel cell stack that does not exceed a maximum power needed by at least one of the battery or the application device being powered by the system, but maintains said desired values of said operating characteristics;

(F) comparing a present value of said output power with a desired value;

(G) calculating a new duty cycle for the associated DC-DC converter within the fuel cell system required to substantially achieve said desired value for the output power; and

(H) signaling the DC-DC converter to adjust its duty cycle to said new duty cycle.

16. (Previously Presented) A method of controlling a fuel cell system, including the steps of:

(A) dynamically determining desired values for a plurality of operating characteristics being monitored in a current mode of operation of a fuel cell system;

(B) measuring each of said selected operating characteristics;

(C) determining a duty cycle required to substantially achieve each individual desired value and storing each duty cycle;

(D) comparing stored values and selecting the minimum duty cycle; and

(E) using this duty cycle as the new duty cycle of the DC-DC converter circuit switches within said fuel cell system.

17. (Previously Presented) The method as defined in claim 16 including the further step of:

periodically repeating determining the desired values and the measurements and updating the duty cycle.

18. (Withdrawn) A method of measuring fuel cell concentration in a fuel cell system:

(A) identifying the weakest fuel cell in a fuel cell stack;

(B) increasing the overall stack output current and varying the duty cycle of DC-DC converter circuit switches coupled to said fuel cell system until the voltage of the weakest fuel cell approaches zero;

(C) measuring the stack output current as a limiting current;

(D) determining whether concentration is too high or too low, based on the measured current value; and

(E) dosing additional fuel or water should a desired value not be met.

19. (Previously Presented) A method of dynamically controlling and managing temperature in a fuel cell system, including the steps of:

(A) measuring the stack output voltage of the fuel cell system;

(B) determining whether the stack output voltage is at a desired value depending upon the present desired temperature range of the fuel cell system, for the present operating conditions, and

(C) adjusting the duty cycle of an associated DC-DC converter to change the output stack voltage to substantially the desired value.

20. (Withdrawn) A method of dynamically controlling the output power of a fuel cell system including the steps of:

(A) dynamically determining a desired value for the output power of the fuel cell system, depending upon the present operating conditions of the fuel cell system;

(B) measuring the output power of the fuel cell system;

(C) if the desired value is not substantially met, measuring fuel concentration;

(D) adjusting fuel concentration to substantially achieve the desired value of the output power of the fuel cell system; and

(E) adjusting the overall stack voltage by adjusting a duty cycle of associated DC-DC converter circuit switches coupled to the fuel cell system to substantially achieve the maximum output power of the fuel cell system.